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Mercredi 23 novembre 2016

Standing Committee on Public Accounts

2015 Annual Report,
Auditor General:

Ministry of Economic
Development and Growth

Ministry of Research,
Innovation and Science

Chair: Ernie Hardeman
Clerk: Valerie Quioc Lim

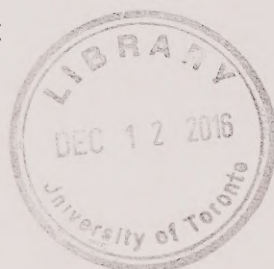
Comité permanent des comptes publics

Rapport annuel 2015,
vérificatrice générale :

Ministère du Développement
économique et de la Croissance

Ministère de la Recherche, de
l'Innovation et des Sciences

Président : Ernie Hardeman
Greffière : Valerie Quioc Lim



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LEGISLATIVE ASSEMBLY OF ONTARIO

ASSEMBLÉE LÉGISLATIVE DE L'ONTARIO

STANDING COMMITTEE ON
PUBLIC ACCOUNTSCOMITÉ PERMANENT DES
COMPTES PUBLICS

Wednesday 23 November 2016

Mercredi 23 novembre 2016

The committee met at 1230 in room 151, following a closed session.

2015 ANNUAL REPORT,
AUDITOR GENERALMINISTRY OF ECONOMIC
DEVELOPMENT AND GROWTHMINISTRY OF RESEARCH,
INNOVATION AND SCIENCE

Consideration of section 3.14, university intellectual property.

The Chair (Mr. Ernie Hardeman): We have everyone present now, so we'll call the meeting to order.

The Standing Committee on Public Accounts is meeting today to have presentations on section 3.14 of the 2015 annual report of the Office of the Auditor General of Ontario.

We have here this afternoon the Ministry of Economic Development and Growth, the Ministry of Research, Innovation and Science, the University of Toronto, McMaster University and the University of Waterloo. We welcome our guests to the committee this afternoon, and we thank you very much for taking the time out of what I'm sure are your busy schedules to be here.

We will have a presentation of 20 minutes from you as a group. Then we will have questions and comments from the caucuses, and we will start with 20-minute rotations. It will start with the government side today, and each one will have 20 minutes.

The second time around, we will divide the time that is left for the presentation by three, and everybody will get that. It's always slightly below the 20 minutes for each one of those. We thank you very much for that.

One other item: We have some new members or some members that haven't been on the committee recently. At the end of the hearing, we will have a short in camera meeting to discuss and give instructions to research as to how they deal with the report writing.

With that, we again thank you all for coming. We'll turn the floor—oh, before we go there, we would ask each person, before you speak, to identify yourself to make sure that Hansard gets the right name to attribute the comments to as we move forward.

With that, thank you very much for being here. The floor is yours.

Mr. Giles Gherson: Thank you, Chair. I'm Giles Gherson, Deputy Minister of Research, Innovation and Science and of Economic Development and Growth.

I'll just introduce my distinguished colleagues here. To my immediate right is Dr. Vivek Goel, who is the vice-president of research and innovation at the University of Toronto. To his right is Dr. George Dixon, who is vice-president of research at the University of Waterloo. To my far left is Dr. Rob Baker, who is the vice-president of research at McMaster University. And to my immediate left is Bill Mantel, the assistant deputy minister for strategic program development and delivery at my ministry.

I'm very pleased to be here—thank you for inviting me—to discuss the Auditor General's report on university intellectual property. The Ministry of Research, Innovation and Science accepts the Auditor General's recommendations. Today I'd like to elaborate on how these recommendations align with the ministry's current mandate.

Discoveries that are a direct result of research drive innovation and lead to life-changing solutions to problems affecting Ontarians and others around the world. A vibrant science and research community is essential for regions in Ontario looking to access, adopt and implement new knowledge to grow their economies. The Ontario government recognizes that our capacity to compete globally depends on how well we can harness our research, innovation and entrepreneurial strengths.

MRIS supports the full cycle of research, innovation and entrepreneurship, from scientific discoveries to translating those discoveries into commercial use. The ministry is committed to sharpening the province's competitive edge by helping to develop new discoveries, inventions that give rise to innovations leading to new technologies, treatments for patients and advances in science, while supporting high-quality knowledge-based jobs for Ontarians.

Ontario has a history of making new discoveries that have altered the course of history. The discovery of insulin, of course, in 1922, and the external artificial pacemaker in 1951 were the results of research here in Toronto, forever changing the lives of diabetics and heart patients around the world.

Now we have companies like Synaptive Medical revolutionizing neurosurgery with advanced imaging devices, and Nymi, using biorhythmic identification to

secure access to our bank accounts. We are home to a leading number of hospitals, universities, researchers, developers and manufacturers that continue to grow in strength.

The journey to intellectual property begins with research, and much of that research takes place at our universities and broader public sector institutions. Research is an economic driver in Ontario and one of the reasons the province supports the full spectrum of innovation to accelerate the translation of scientific discoveries from the laboratory to the marketplace. That's why we make strategic investments to mobilize and prepare researchers, entrepreneurs and companies to successfully compete and create the jobs of the future. Our government recognizes that Ontario's capacity to compete in a fiercely competitive global economy depends on how well we can harness our research, innovation and entrepreneurship strengths.

Canada ranks sixth in the world in the quality and impact of research, with Ontario comprising nearly half of the national research enterprise.

Fundamental science is vital to Ontario's future growth and competitiveness in the 21st century. In a global economy, innovation leaders are those that place a premium on supporting creativity and research excellence.

Take, for example, Ontario's Early Researcher Awards program. It helps promising researchers build their research teams. The program also helps Ontario to attract and retain the best and brightest research talent, who will train the next generation of researchers and innovators. Since 2005, Ontario has supported the training of over 31,500 highly qualified personnel through the Early Researcher Awards program.

Another program is the Ontario Research Fund. Support from the Ontario Research Fund is helping to strengthen research excellence at the province's world-class post-secondary institutions and research hospitals. Ontario Research Fund projects have leveraged \$3.5 billion in funding and helped create more than 103,000 training opportunities since 2003.

Earlier, I mentioned the names of a couple of companies—we have many, many companies like these, but I mentioned two of them that have found success and grown out of Ontario universities. Nymi was born out of a lab at the University of Toronto investigating fingerprint and retinal recognition. A PhD student came across a paper in a medical journal that posed a problem for the medical community but offered an opportunity in the cyber security field. Doctors had found it difficult to create a standard diagnosis for heart arrhythmia because everybody's heartbeat is unique. U of T researchers use that same trait to pioneer the field of cardiac sensory recognition. Building on this, Dr. Foteini Agrafioti and Dr. Francis Bui developed a technology that is revolutionizing banking security, among other fields. They created a wristband with sensors that are programmed to recognize the unique electrical signals emitted by the user's heart, also called an electrocardiogram. Without

the heartbeat identifier, the Nymi Band shuts down, making it useless if someone steals the device and tries to access your bank account. The Nymi Band has been piloted by the Royal Bank of Canada, where Dr. Agrafioti is now chief scientist.

It's being used by another Toronto start-up, BioConnect, in Liberty Village in Toronto. You may be familiar with BioConnect's technology because they are the company that provides the wristbands used by visitors to Disney World. They also provide cyber security products to the United States Department of Homeland Security.

Between Nymi and BioConnect, the two companies employ more than 100 people and are growing fast.

Synaptive Medical's founder Cameron Piron and his fast-growing team of 400 employees developed the BrightMatter neurosurgical guidance system. The BrightMatter system produces a three-dimensional road map of the brain to help neurosurgeons do surgical planning, provides real-time magnified images of surgical fields—and uses a robotic arm to guide the surgical tools during tumour removal, so it's pretty high-powered. They've sold dozens of systems worldwide, and as they've been growing, they've been expanding their relationships with the University of Toronto and the University of Waterloo.

They also use support from the Ontario Centres of Excellence, the province's health technologies exchange program, and Mitacs, which helps build relationships between academia and industry.

Many who have worked for Synaptive, which now has over 400 employees, as well as Cameron Piron's previous company, Sentinelle, have gone on to create their own start-ups here in Ontario.

Let me tell you a bit more about the work of the Ontario Centres of Excellence, one of our key partners in delivering the innovation agenda. In partnership with industry, OCE co-invests to commercialize innovations originating in the province's publicly funded colleges, universities and research hospitals. They also support and invest in early-stage projects where the probability of commercial success and potential return on innovation are substantial. The OCE offers programs that accelerate the commercialization of intellectual property coming from our academic and research institutions. OCE works with high-potential, early-stage entrepreneurs and innovative enterprises to help these emerging businesses grow to the point where they can attract private investment and ultimately become sustainable, global competitors.

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We go well beyond universities and research hospitals. The ministry also supports research and innovation as a means of turning global challenges into opportunities. Ontario has invested in a number of world-class research institutes that are making advances in cancer, neuroscience, regenerative medicine and theoretical physics. The Perimeter Institute, the Ontario Institute for Cancer Research and the Ontario Brain Institute, to name three, are mobilizing their research from the theoretical to the

practical. Whether in the form of spinoff companies or patent applications or, in Art McDonald's case, a Nobel Prize in physics, there's plenty of measured success.

While we would ideally like to see more of the research in Ontario's universities translating into commercially viable goods and services, and result in more patents, we need to have realistic and measurable expectations. A balance between fundamental science and the application of that science is important. Ontario intentionally supports the full innovation continuum, from scientific discoveries to translating these discoveries into products and services that can be brought to market.

This is a classic iceberg. We only see about 10% of an iceberg's total mass above the water, while 90% of it is underwater. We all know that. Similarly, the relationship between research and commercialization: On the surface, the public may only see and hear about the rare Art McDonalds of the world winning Nobel prizes, but under the radar there are thousands of researchers across this province working on the next breakthrough in nanotechnology, genomics, quantum computing, fintech or biomedicine. What are often overlooked are the spinoff benefits in promoting and supporting research, a highly skilled workforce and a vibrant innovation ecosystem.

The ministry has been implementing strategies, policies, programs, services and initiatives that are consistent with the direction laid out in the 2008 innovation agenda. We do believe our ministry is acting as a catalyst for change. The ministry has been working collaboratively across government and between ministries on key innovation initiatives in strategic innovation areas including the Ontario Health Innovation Council, the climate change action plan and the Premier's Highly Skilled Workforce Expert Panel, as well as the digital infrastructure broadband strategy.

The audit recommended a coordinated and comprehensive effort by the ministry in the government's innovation culture. In the throne speech, the government signalled its readiness to make good on that recommendation by committing to hire a Chief Science Officer. The goal is for the new CSO to provide and lead a comprehensive approach to advance both basic and applied research from within our ministry. Recruitment is now under way. This, too, aligns with the ministry's current mandate to consult with and engage with the scientific community and the broader public to develop the mandate of the Chief Science Officer.

The ministry's research branch has designed a research inventory tool to track provincial funding of research activities across all government ministries and within the province. The tool identifies current research funding programs and captures the number of research projects supported, the nature of the scientific activity, the types of IP tracked by ministries and the total funding amounts spent through the fiscal year, as well as the proportion of this total allocated towards the direct and indirect costs of research.

The audit also recommended tracking the new technologies and inventions resulting from research funding.

The ministry does monitor the commercialization potential of research projects that have received provincial funding. However, often it is difficult to know with any degree of certainty the nature of ministry-funded projects in the early stages of research, and that's just the nature of the beast.

The ministry regularly monitors the progress of Ontario's innovation performance through a variety of performance measurements from multiple sources that are publicly available, such as Statistics Canada, Thomson Reuters, the Canada Foundation for Innovation and the Tri-Council publications.

The ministry also helps fund independent think tanks that track economic and innovative performance of the province. These research bodies publish independent, publicly available reports that help position Ontario's performance against key measurements of economic performance, competitiveness, productivity and innovation in comparison to peer jurisdictions.

When it comes to the barriers facing commercialization, we're well aware that the road to commercializing new technology, medical breakthroughs or scientific discovery can be challenging. That's why the government is continually assessing the approach to commercialization of intellectual property in Ontario.

As was stated in the 2015 budget, we have committed to evaluate the effectiveness of Ontario's key commercialization support system, the Ontario Network of Entrepreneurs. The Ontario Network of Entrepreneurs was created to pool together the full spectrum of programs, services and resources available to Ontario's entrepreneurs. The ONE is comprised of 18 regional innovation centres that strengthen the relationship between entrepreneurs and investors. The best known of those are, for example, MaRS in Toronto, Communitech in Waterloo and Invest Ottawa in Ottawa. Researchers, entrepreneurs and business leaders have access to the resources offered at these centres to help them commercialize new ideas and build innovative businesses.

In 2014, the ONE assisted entrepreneurs to launch more than 6,000 new start-ups and helped create over 16,000 new jobs. We want to make sure that the ONE continues to fulfill its mandate, and that's why we're drawing on the expertise of an international review panel. With the advice of the panel members, we'll determine if the ONE is still on course or needs to adjust its direction for the coming years.

The panel will also act as our compass, providing knowledge and insights into making recommendations to the government, recommendations on how to strengthen Ontario's position as a top global jurisdiction in innovation and entrepreneur ecosystems, and on how to improve the current model and suite of programs and services offered by the ONE.

The review is intended to assess the effectiveness and efficiency of the ONE, identify opportunities to better meet client needs, and strengthen Ontario's entrepreneurial and innovation ecosystem in the international arena.

The Auditor General recommended that the government ensure value for money in its investment in research

and commercialization activities through a variety of tactics and measures. I'm pleased to report that the ministry has developed and fully tested a tool that tracks the portion of research funding that goes to basic versus applied research. The tool is currently being piloted with the University of Toronto and McMaster University. The ministry does collect performance results for funding related to commercialization supports as part of its contract requirements with recipients.

The ministry is continuously improving its data collection methodologies and approaches. To date, these continuous improvement practices have yielded favourable, quantifiable results. With respect to reporting on performance results on research funding and commercialization programs, the ministry is exploring options to publicly report its program achievements. As we explore options with the team at Open Government and Open Data, we are mindful of what impact that sharing this information could have on recipients.

According to the World Intellectual Property Organization, the promotion and protection of intellectual property spurs economic growth, creates new jobs and industries, and enhances the quality and enjoyment of life. It can act as "a catalyst for economic development and social and cultural well-being." I'm pleased to report that there were 221 patent applications and 62 patents granted here in Ontario in 2014-15.

The Auditor General suggested that we also explore the pros and cons of including provisions in selective research funding agreements so that the government might share in future income from the sale or licence of resulting intellectual property.

We believe that Ontario's current approach to intellectual property ownership is consistent with best jurisdictional practices, federal policy and academic industry preference. Our approach is based on the recognition that government ownership of IP is costly and may be an impediment for commercialization and innovation.

Rather than focus on ownership, the ministry has been working on its mandate to explore ways to promote the availability of intellectual property services for Ontario businesses and entrepreneurs. As the committee may already be aware, the regulation and administration of IP law in Canada is a federal responsibility. Nevertheless, the ministry absolutely recognizes that improvements in the current IP framework could help Ontario companies to scale up more rapidly by attracting capital and improving global competitiveness.

In particular, the ministry recognizes that there are steps it can take to stimulate and motivate better awareness of existing IP law across the innovation ecosystem. To that end, the ministry has implemented a number of measures related to IP rights that are aimed at improving uptake by companies of existing tools, such as the support for R&D, technology acceleration and commercialization.

The ministry is currently exploring additional opportunities to increase IP outreach and awareness, fostering a closer dialogue with universities and initiating discussions with the federal government.

Intellectual property is becoming increasingly important in the globalized, interconnected world and therefore needs to be considered among other instruments as Canada and Ontario move toward innovation and a knowledge-based economy. In a rapidly evolving global IP landscape, national and subnational jurisdictions are called upon to initiate co-ordinated and strategic approaches to foster IP as a component of a sophisticated innovation ecosystem that will accelerate commercialization.

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The ministry convened a round table on intellectual property in partnership with the Centre for International Governance Innovation, CIGI, back in September of this year to explore how Ontario can contribute to strengthened IP protection and strategic management strategies in Canada to support innovation and commercialization. As next steps, the ministry is planning to hold a second IP round table in December to further review IP solutions and initiatives proposed by participants during that first September IP event.

Many aspects of the IP ecosystem relate to regulations and international trade that fall within federal jurisdiction. Therefore, Ontario will engage in discussions with the federal government on potential collaboration and strengthening IP in the innovation ecosystem in Ontario and Canada.

Today we've demonstrated the ministry is fully engaged in the research it funds and the resulting intellectual property. We're proactively pursuing tactics as well as refining existing approaches to tracking research funding and that which translates into opportunities for commercialization in intellectual property. While this is a shared responsibility with our colleagues at the post-secondary institutions and other research establishments, we recognize the important role that government plays in setting a precedent and leading by example.

Thank you very much, Chair.

The Chair (Mr. Ernie Hardeman): Thank you very much for your presentation. We are just under the 20 minutes, so we'll start with the questions and comments. The government first: Mr. Milczyn.

Mr. Peter Z. Milczyn: Thank you, Mr. Gherson, for your presentation. I was very interested in the aspect of your presentation where you were touching upon aspects of how our initiatives in this area of supporting research and innovation compare to our competitors' in the country and internationally.

Around some of those issues around the protection and ownership of intellectual property and how we handle it in Ontario versus our competitors, how do we stack up, both in terms of our universities' and academic institutions' approach to sharing intellectual property with the researchers and innovators, and governments sharing or not sharing in the value creation of that intellectual property compared to what governments and other jurisdictions might be doing?

Mr. Giles Gherson: I'm going to let Dr. Goel answer that question, but let me first preface that by saying that

when you look at the numbers, I think our numbers look pretty good at the university level, but what often is missed is the number of patents that are generated indirectly from universities by companies that we support, by the entrepreneurial firms that are created and that come out of the university system.

I think there was a chart in the Auditor General's report that was quite interesting. It showed patents emanating from the three universities represented here today and a triumvirate of Canadian universities and then American universities. The numbers of patents looked a little low, but I think it was deceptive because of the way our patent system—in a sense, the way we generate patents often from university researchers, who then form a company, and then as the company is being formed or as it's scaling up, they move to file for their patents and then have them licensed. So I think that some of those numbers can be a little deceptive and I think the role, for example, that OCE plays—I referenced OCE in my remarks—is quite substantial in terms of helping university research connect with business and translate into start-up companies that then file for patents.

I'll let Dr. Goel—

The Chair (Mr. Ernie Hardeman): If I could just stop you for a minute: Make sure you move your microphones so the sound goes through to the Hansard. If we could do that, please.

Interjection.

The Chair (Mr. Ernie Hardeman): It goes on automatically. If we just make sure we're speaking somewhere near it.

Dr. Vivek Goel: Okay, thanks. It's Vivek Goel from the University of Toronto. Thanks, Deputy Gherson, for that introduction. It covered really important points.

It's a very important question that's been posed on protection of intellectual property. I think you also referenced the sharing, the value and the benefits with the inventors and with other parts of our ecosystem. I think that it's important to actually separate those two aspects out, between protection of intellectual property and ensuring that there are appropriate incentives for our inventors and our companies as they start up. Ownership of IP and the revenue sharing often get conflated together.

I'll explain: Intellectual property is patents and so on and registering. Many products that come about will actually rely of a range of intellectual property. If you think of a smartphone, there are thousands of patents that have gone in. That's why Apple is always in litigation, or why BlackBerry was always in litigation: because there are thousands of patents that go in. For any given patent, you can actually have dozens of people involved, particularly when it's university research: the professors who are involved in research; sometimes there are collaborators; their graduate students; their post-doctoral fellows. If the IP rights were simply left to the individuals, you could wind up with a situation where a company that's coming in to license that technology is faced with having to do arrangements with all of those different individuals.

In most jurisdictions, we've seen a move to regimes where some entity is looking at taking on that IP. In this province it's the university—my colleague from Waterloo will describe a slightly different approach—so that it becomes easier to get that licence on.

At the same time, universities look at how they share the revenue. Even if the IP is assigned to the university, there's a revenue-sharing formula with the inventor. That becomes the important piece around ownership versus revenue sharing.

In the United States, in terms of comparing to other jurisdictions, there's actually an act called the Bayh-Dole Act, which sets out that for all publicly funded research, the university or the institution that is sponsoring the research has to take the intellectual property. That has had some benefits, because it has concentrated the ownership of the IP, but it has also led to situations where inventors feel that they lose control of that.

There are some jurisdictions where the funding body tries to take a stake in the IP. I think that's a question about whether the Ministry of Research, Innovation and Science, as the funding body, should take a stake in the ownership of IP.

The challenge there becomes, first of all, as Deputy Gherson noted, there are costs to maintaining that ownership. You've got to file the patents; you've got to pay for it; you've got to protect it; you've got to watch out for other people trying to use it. But more significantly, when we look at the individual research program, it may involve, as I said, multiple researchers, but also multiple funders. So we may have funding from the Ministry of Research and Innovation, we may have funding from the Natural Sciences and Engineering Research Council, from an industry partner, and so on. If everyone has a stake in that IP, the ownership becomes very complicated, and we wind up losing the opportunity to license it. Industry coming in and looking at that will say, "This ownership structure is too complicated. We're going to go somewhere else."

I think that was the key point: The government ownership of IP or the funding agency ownership of IP can complicate things.

Dr. George Dixon: There's a slightly different model at the University of Waterloo. Intellectual property at the University of Waterloo is inventor-owned. It is owned by the faculty member or the graduate student who invented it.

There are really two paths that can go forward with respect to commercialization of that IP: A faculty member or a graduate student can take their IP and protect it and commercialize it, independent of the university; or they can work with the university for assistance in protection and commercialization of that IP.

This has been the approach at the University of Waterloo since day one, 60 years ago. We've always had the same IP policy. It contributes to attracting people to the university who are entrepreneurial in nature and are willing to move forward with respect to commercialization of their IP. It is particularly suited to the types

of intellectual property that can be used for a start-up or something where you can have a relatively short period of time, to building a company and getting the ideas out there.

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The other path that I described is one where they can work with the university in order to protect the IP and commercialize it. Under that pathway, the inventor still owns the IP but the university manages it. That is, frankly, more suited to the type of IP that you would license, say, to a large corporation like an automotive company. Also, frankly, that approach is better suited to the types of intellectual property that might take a very long period of time prior to commercialization, something like you might have in a pharmaceutical space or a medical space, where there are extensive clinical trials, effectively, that have to be done.

The approach that we use—I can give many examples as to why it's successful. We really do not concern ourselves too much about generating revenue for the university from our IP. We worry more about the idea of getting the intellectual property commercialized, to effectively generate revenues and create jobs. If you look at the Waterloo ecosystem, there are more than 1,200 companies in that area. Coming out of the university since 2008, there have been over 200 companies founded that are still in business—the small SMEs. They have raised more than half a billion dollars in capital and have over 1,000 employees. This goes all the way to companies like OpenText, that was effectively founded under this IP policy. Faculty members in the English department and the computer science department took a contract to digitize the Oxford English Dictionary. Since 1985, that has driven and developed into the company OpenText, which is the largest software company in Canada, with a market cap of \$10 billion.

The Chair (Mr. Ernie Hardeman): Okay. Another question?

Mr. Peter Z. Milczyn: That was very interesting, certainly—the responses around the role that the ministry could play in owning, and that with ownership come obligations and responsibilities. I guess somebody made the comment about Apple always being in litigation, and, I guess, the potential that the ministry, as an owner, could end up in significant litigation, over time, in protecting those IP rights.

From the comments that you've provided, would it be fair to take away from that that government ownership, or direct government takings, could be a barrier to commercialization of some of this intellectual property? I guess the follow-up to that is, whether it is a barrier or not, what steps is the ministry in fact taking to remove barriers towards commercialization of the research that we're funding?

Mr. Giles Gherson: Thank you. To the first question, government ownership, I'm not aware of any jurisdiction in the western world where government actually owns the IP it has created. The Bayh-Dole Act in the United States sets a framework around what researchers have to

do in order to ensure that the research they're conducting, the patents that might emanate from that—in a sense, it's a great approach in some ways, because it ensures that technology transfer officers, for example, in universities are aware of what potential paths or commercializable activity might be coming out of the research that's being conducted.

We have a different approach. We have two different university approaches. I think when you actually look at the results, you find that it's hard to say that one is better than another. They're different, and they yield somewhat different results but not necessarily better or worse.

This is an issue that has been around for some time now. It engages us; we're interested in it; we want the best results. So we've been thinking hard about it. Is there a better way? The research we've been able to do so far would suggest that there isn't a better or worse, but there are different but equivalent, perhaps, approaches.

I think it does come down, from the province's perspective—working with the federal government, as I mentioned, because they have a primary role in IP protection and patent protection—to the protection and strategic management of IP, because as my colleagues here have referenced, IP is becoming—I'm just going to use a military analogy—like the arms race. Essentially, the countries with the most IP are going to win.

What happens is that organizations or companies that are formed that then start to embark on commercialization and sales in the global marketplace can find—I think we heard much about this during BlackBerry's prime—that there are groups out there in other countries that are really IP predators. Essentially, they amass portfolios of IP, of patents, in order to constrain the ability of companies that are emerging to actually be able to sell their products freely in the marketplace.

This use of this predatory and very aggressive approach to IP, I think, is causing jurisdictions like ours to say, "How are we doing in that field?" We're developing companies; we've got one of the dense pipelines of start-up companies outside of Silicon Valley in Ontario. It's a demonstration of the innovation in this province and how well we're doing at commercializing IP in its many different forms, including patents. But the question is, as we try to scale up the best and highest potential and highest-impact of those companies: How do we enable them to play a role in the global marketplace without being impinged by large, foreign multinationals, law firms with backing from hedge funds that are spying on a lot of IP around the world in order to constrain and to profit on, in a sense, other people's investments and innovations?

That's the reason we did a round table on IP policy back in September. There were 53 participants, including Jim Balsillie and many others, including the federal patents office and some of the best legal professionals and academics on IP protection and strategic management. We raised a number of questions there. We're actually going to have another follow-up round table in December. It's a very sophisticated, complicated field,

and we want to feel our way to kind of understanding where the gaps are.

There may be gaps in the area of education: At universities, are students who are maybe thinking about becoming entrepreneurs really aware of IP law and patent protection and strategic management? Because as they think about the things they might want to do later in life, they need to be aware that this is a crucial issue. Inventing something is great, but how you protect that is maybe more important, and that's not the way it's often viewed. These inventors are often much more excited about what they're inventing than protecting it down the road. So that's one aspect.

There's the whole question of advice and counsel: I've created my product. I'm a start-up company. Now I'm thinking about emerging onto the global market, or even the Canadian or American markets. What, really, do I need to know about IP protection and strategic management at a sophisticated level? Is the right advice available to me at a price I can afford? Because a lot of these small companies don't have a whole lot of resources to expend on these things.

A third one is—and this may be related directly to your question: As a jurisdiction, is there a more direct role to play in the strategic management of the province's IP? That's the kind of advice we're seeking from these round tables.

Mr. Peter Z. Milczyn: Are we looking at any regulatory impediments over which we have exclusive control that are barriers to commercialization, as opposed to federal legislation or federal—

Mr. Giles Gherson: I think those are mainly federal. In a number of these areas now—whether it's immigration policy, which is largely federal, or what have you—we're playing, I think, a more aggressive role as a province in working with the federal government to try to get policy changes that meet our needs and requirements. We're not there yet, but we will be in discussions with our federal counterparts.

Mr. Peter Z. Milczyn: My colleague might have additional questions.

The Chair (Mr. Ernie Hardeman): You have two and a half minutes left.

Ms. Harinder Malhi: Okay. Thank you for your presentation. There's a lot of information there. I'm going to ask: Are there any particular areas of research which you think Ontario excels in?

Mr. Giles Gherson: Well, there are a number, actually. In fact, it's quite an impressive and long list. I'll let my university colleagues, perhaps, add to my list, but as I think about the list, I think about oncology. I think Ontario—and certainly the area around here, around the University of Toronto and the research hospitals here on University Avenue—is a world-renowned centre for oncology research and development.

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I mentioned a company, but there are numerous companies. Synaptive has come out—in fact, Synaptive is a very important organization in terms of neurological

scanning for cancer. But there are numerous companies that have spun out of that.

Neurological research is another very large one. Stem cells and regenerative medicine is another centre of excellence for Ontario. ICT, hardware, software—particularly up in Ottawa, where you've got the remnants, in a sense, of the Nortel infrastructure. And 5G mobile is the next big thing in mobile. Ontario is a global leader in that.

Artificial intelligence: At the University of Toronto and Waterloo and McMaster, you see a real growth in artificial intelligence. Some people would say that Toronto is ground zero for artificial intelligence and deep learning, around the work of Dr. Geoff Hinton. And then there's quantum physics, of course, and the work being done at the Perimeter Institute in Waterloo and at IQC, the Institute for Quantum Computing.

Those are some of the really important platform technologies. They're driving a lot of change that Ontario has a significant presence in.

Ms. Harinder Malhi: How much time do we have?

The Chair (Mr. Ernie Hardeman): If I just hesitate, it will be all gone. So thank you very much.

With that, we'll now go to the official opposition: Mr. Hillier.

Mr. Randy Hillier: Thank you for your presentation today. I think I'm going to restrict my questions to Mr. Gherson.

I'll start with this: When I was reading through the Auditor General's report, I was quite alarmed at some of the elements in the report. We know that there was this announcement that the government was going to take innovation and research and drive forward with it, with that 2008 announcement. But some of the very basic management oversight and accountability tools seem to be not there. Going through the report and finding out that the ministry does not coordinate or track the province's investments in research and innovation—even that the Auditor General couldn't find from your ministry just how much the government spent, what the expenditures were, and had to go elsewhere to find what the total expenditures were.

Not knowing the total amount of provincial funding, and not knowing what the result of that spending was, if there was any commercialization or being able to put any value on commercialization with that expenditure; not knowing what level of intellectual property was derived; and not even attempting to measure what value we're getting from these investments—I found it alarming. In addition, there's no reporting back. Once the funding is advanced, there's really no expectation to report back to the ministry on what was accomplished with that. That was alarming to me.

After that many years—I could maybe see after a year or two that not all the mechanisms were in place, but since 2008 till now, that these tracking mechanisms and these oversight and accountability mechanisms have not been engaged is alarming.

But I want to focus in on one element. There was just a question from our members on the Liberal side about

barriers, and speaking directly about regulatory or bureaucratic burdens as barriers. When the question was posed, there was no response back, as if there were little or no regulatory barriers. But that's very much identified in your own reporting and through your own round tables, that regulation and bureaucracy is a barrier to commercialization. Even though it hasn't been itemized—what regulations are a barrier, what parts of bureaucracy are a barrier—I think that's the first place we need to know. I think it would be incumbent upon the ministry to actually begin itemizing what regulations are barriers. There's no way we can improve the system if we don't know what the actual obstacles are.

Maybe you could fill me in on both of those elements. Why has it taken this period of time, and an Auditor General's report, to have the ministry recognize that there's a need for some basic accounting mechanisms to be in place? And what are we doing to knock down the barriers to commercialization specifically, if there are any?

Mr. Giles Gherson: Sir, if I had read the report the way you did, I'd be alarmed as well, but I didn't—

Mr. Randy Hillier: I could tell by your presentation that you didn't read it the same way.

Mr. Giles Gherson: Yes, because, if you recall, I cited numerous statistics to show that we actually have a pretty good handle on the results from our research and innovation activities. I cited numerous statistics to do that.

I can perhaps recite some of them now. Let's take the Ontario Institute for Cancer Research, where we have committed \$1.16 billion since 2005—

Mr. Randy Hillier: Excuse me. Instead of reiterating—there is no reporting mechanism back after funding has been granted. Maybe you could speak to the ones, some of the elements, that I raised.

Mr. Giles Gherson: I'll let my colleague Bill Mantel respond.

Mr. Bill Mantel: On that point, there is actually quite a lot of reporting that we get back. If you step back and answer the question, "Why are we investing in research?", there are a lot of reasons. First of all, it's attracting a lot of talent, trying to attract the best minds to the province to do research that is the beginning of the innovation pipeline. Secondly, it's a very powerful training tool for master's and PhD students and lots of other senior, fourth-year students that go through and participate in the research, which is very valuable to companies that are hiring these graduates after.

Before we even commit a dollar to the research, we go through a very rigorous peer review process, first of all, which first answers the question, "Is this the best science in the world, and are we funding the best science in the world?" If the answer is no, we don't fund it. But it asks another question, which is, "Is this science important to the economy, or is this science important to the province in some other goal?"—for example, health care, or the environment. The answer to both of those things needs to be yes before we fund it.

I have to say that I regularly get comments from researchers around the world that we engage in our peer review process, who constantly say that it's one of the best, most rigorous and, I think, most effective peer review processes that they participate in.

The fourth thing that is important is that you have to remember that our research funding is built on all of the research funding that the federal government puts out there—that is, engineering, social sciences. They actually fund a broad base of basic research. What we're trying to do is build spikes of excellence on top of that research. When we build those spikes of excellence on top of the research, we attract the best people in the world, who then, in turn, are able to go to the federal government and apply for research grants and do better, because they're globally significant researchers, which means that our provincial funding is leveraging more federal funding. So those are all the reasons that we do it.

The data that we track—we get reports every year. The flagship program is the Ontario Research Fund. Vivek might actually complain about the amount of data that we ask him for. Largely, we track HQP—how many PhDs, how many master's students, how many people are participating in the research—because that's probably the most important public policy goal that we have around this research, including upgrading the whole education process.

We also track patents and disclosures. Every time they apply for a patent or they file a patent, we track all of that. One could quibble with whether or not that's a lot or not so much compared to other jurisdictions, but we track all of that.

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What is much more complicated to track is what happens to those patents over time. That's where, I think, Dr. Goel explained—we're about 10% or 15% of all the research that gets funded in the province. Very often, there's our research money going in and there's funding coming in from other parts, so I think for us to track just ours would be very difficult and time-consuming and costly, but I'm not sure we could ever get a really accurate handle on that. I think your point is a good one, and by the way, the auditor raised this in 2004 and we had a good debate about it. In 2009, we had a good debate about it.

We're tracking a lot of things about the research, and that's the one point that I think—it's very difficult to track what happens to a patent beyond the five years of our funding, because often it might be two or three or four or five years later that something actually starts to materialize.

Mr. Randy Hillier: Let me ask one other question: Is there any tracking or any—what are you doing, looking at these barriers to commercialization again and how barriers to commercialization may impact the transfer of intellectual property to other jurisdictions? Are you tracking that? Are you looking at that intellectual property that gets developed here, but then gets commercialized elsewhere? Are you tracking that at all?

Mr. Giles Gherson: I'll say that that's something that we are, I think, a little concerned about, but it's not first order; it's second order. We'll have a company that will spin off out of the University of Toronto or Waterloo or McMaster into our OCE program, which has been very strong at connecting university research with entrepreneurial opportunity, and they might go to MaRS or Communtech in Waterloo.

Just to your question about how we help commercialization: We do it through OCE, Ontario Centres of Excellence. We do it through our regional innovation centres all around the province, which incubate these start-ups and help them to grow, mentor them, help them to find capital and help them to find markets, because those are the crucial elements to commercialization. The core barriers—and I'm sure you've heard this many times—are access to capital, access to talent and access to market.

Our network—which we get pretty high marks for, I have to say, internationally. I'd say I came to this job as a bit of a skeptic, and I've been quite impressed by what I've heard as I've gone to international meetings and elsewhere. People are looking at our network of supports for enabling entrepreneurs to take intellectual capital, to take patents and IP, from university settings or college settings into the marketplace. We provide them with supports.

I don't think we'd say we've hit it out of the ballpark in the sense that companies—we've got, as I said, one of the densest pipelines of start-up companies in North America. Outside of Silicon Valley, we're number two. But those companies sometimes struggle to grow into medium-sized and large companies, and we're putting a lot of effort now into looking at that.

Mr. Randy Hillier: What about a feedback mechanism from the ministry? When intellectual property is either patented or licensed or created, I guess, and when bringing that intellectual property to market or to be commercialized, when a barrier is found—and not venture capital. I mean that institutional barriers are met: length of time for permitting or length of time for licensing whatever from government agencies. Is there a mechanism within your ministry that collects that information and then brings it back to other ministries so that they are aware that they are impeding or being a barrier to the commercialization of that property?

Mr. Giles Gherson: That's a really good question. We launched about a year ago something called the Business Growth Initiative, which is kind of our innovation policy or strategy. There are three legs to it. One is scaling up companies, because we think that's crucial. A second part is really focusing on innovation itself and the development of the innovation ecosystem here in Ontario because some of these new technologies that are coming on stream, whether it's nanotechnology, whether it's quantum physics, whether it's AI, are new, and we've got to figure out how we can—and I think we're doing a pretty good job—further develop these technologies here and then diffuse them into the marketplace. That's the second leg.

The third leg is regulatory modernization, which is the question you're speaking of. Our division called Open for Business: We have totally overhauled it in the last six months. We've created a branch that essentially—I'll call them a SWAT team. The SWAT team's role is to kind of keep an ear to the ground, and through our ministry and other ministries, when we hear about companies that face regulatory bottlenecks—some of them are in these new technologies.

You have a regulation, as you can imagine, that has been in place for 15 years, and all of a sudden, a new technology comes and the regulation makes no sense. The regulator says, "Well, I'm obliged to administer the regulation as I find it, not as I might make it up, because that's the requirement." Then we have to change the regulation.

So what do we do? We have this SWAT team that essentially, as I say, goes out and roots out and destroys those kinds of bottlenecks. We do it through a mechanism where we work with the ministry involved to see how justified it is, because we want to keep the high standards of protection for Ontarians. The government is committed to that. But often, it's being done in a way that is unnecessary.

Then we take it to a regulatory modernization committee at the centre of government, which is co-chaired by the secretary of cabinet and Ed Clark, the Premier's business adviser, and we bring a recommendation to them. From there, they either say, "That makes no sense," or, "It does make sense," and then we drive it through.

What we also have now is—well, it's a bill that's actually pending in the House, which is a bill that would create an annual regulatory modernization of burden reduction. It's called the Burden Reduction Act. It provides an opportunity every year for this process to lead to reforms or changes to any number of regulatory obligations that are onerous, burdensome, unnecessary, duplicative or out of date. That's the one that we're focused on.

Mr. Randy Hillier: So I can take a look through Bill 70—no, not Bill 70. What's the Burden Reduction Act?

Mr. Giles Gherson: It changed because it was reintroduced.

Mr. Randy Hillier: Yes. So I'll be able to take a look through there and see some of these regulatory changes, and then be able to identify that it was the result of the Ministry of Innovation?

Mr. Giles Gherson: Yes, you will. But the one that I would really urge you to take a look at is the next one, because I said that this process is six months old. We're now amassing, through the network of government, great candidates for next year. We've gotten going. We think that this is really important to removing barriers to successful commercialization of innovation in Ontario.

Mr. Randy Hillier: I know that things work slow in the government, but after—

Mr. Giles Gherson: Not here.

Mr. Randy Hillier: I'll leave it with that

The Chair (Mr. Ernie Hardeman): Mrs. Munro?

Mrs. Julia Munro: How much time do we have?

The Chair (Mr. Ernie Hardeman): You have just under four minutes.

Mrs. Julia Munro: Okay, thank you very much.

Thank you very much for joining us today. I certainly appreciate the complexity, or perhaps I am just barely understanding the breadth of that complexity, which I think leads to some issues around the availability of information for people in our position. With the multitude of various endeavours that all fall under IP activity, clearly they're not all going to fall under the same regulatory burden as well.

I wanted to, first of all, ask you if you could identify a couple of examples where it looks like there isn't proper oversight, but it's because oversight has to be developed according to what particular activity in IP that you're looking at. I'm asking you for things that—you mentioned Open for Business. To me, there must be an internal challenge to that, in making the updates appropriate for the activities that you're involved in, because of the breadth of those activities.

Can you give us an example of where you would have to create unique kinds of oversight for a particular kind of development?

Mr. Giles Gherson: If I go back to the Open for Business—perhaps I'll let Bill or one of my other colleagues respond. In the reorganization and restructuring of the Open for Business division, we want it to be more activist. It's a question of how speedily we can respond.

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There are two things: There's a SWAT team which is responsive to concerns that are expressed to us, or to anybody in government, essentially, about a regulatory requirement that seems to be overly burdensome, hard to understand, or just doesn't seem to make sense. We examine it and then see whether there's a problem that we need to resolve.

One of the ways we've actually been gathering this information is through the Red Tape Challenge. We've had two Red Tape Challenges. These are open-platform online—in a sense, crowdsourcing: "Tell us what your concerns are with this." So we did the auto supply sector. We had a Red Tape Challenge in the spring and early summer in the auto supply sector. It was fascinating. We got a lot of response from the sector, which is fairly heavily regulated, and we came back with a raft of proposals for regulatory modernization.

I use the word "modernization" because it's not necessarily them coming in and saying, "Get rid of regulations." They're saying, "This doesn't make sense in the way we operate today." We're in the process of responding to that. As I alluded to in response to MPP Hillier, you'll be seeing, in the next burden reduction bill, examples that will come out of that.

The food processing sector is a very different sector. Different sectors have very different needs and requirements. We did a Red Tape Challenge in August for the food processing sector, and that surfaced a whole other

set of regulatory requirements that the sector felt were too onerous or out of date or what have you, so we're now going through those.

The Chair (Mr. Ernie Hardeman): Hold that thought; maybe it'll fit the next question. But we have to go to the third party.

Mr. Percy Hatfield: Good afternoon. Thank you for being here.

As I understand it, the Auditor General has found that the ministry wasn't effective in coordinating the province's investments and research and innovation activities. The ministry did not know the total amount of provincial funding provided annually, either directly or indirectly, for research and commercialization. The ministry does not always know whether the research it funded had resulted in intellectual property. There was no process in place to make other ministries aware of new technologies and innovations developed with provincial funding. And there was no tracking if government ministries or agencies who had initially indicated support for a research project are using inventions that may have resulted from the research or are benefiting from funding provided.

So my first question would be: What steps is the ministry taking to develop better performance measurements to track progress on research and innovation?

Mr. Bill Mantel: There's a lot in there.

First of all, as in a previous answer to a question, we collect a lot of data on the impact of research, to try to track the public policy benefit from it. A lot of that stems around HQP and so on, which I talked about earlier.

I think the key theme that the Auditor General pointed out was around being able to track the impact of the IP. As I said before, our funding agreements tend to be five years long, and we track disclosures and patents that universities make during the course of that five years. As I said before, it's very hard to track that afterward, because often our research funding is commingled with other funding, and sometimes it takes two, three, four, five or 10 years for this intellectual property to actually get picked up by somebody else. A whole lot of other invention and development has to go around it, so if you talk about basic discoveries or even applied discoveries, that next development phase can be very long.

I think suggesting that we're going to track for that long and try to keep track of it all—it would be complicated. It would be onerous. I think the fact that universities—that's where all this stuff comes together, in the university tech transfer offices. That is indeed the best place to track it. That's where their role in trying to find receptors, trying to help bundle IP together to create start-up companies, which is the beginning of the pipeline—that's a much sounder place for that to happen. Having said that, we definitely want to see: Is there more we can do around tracking the long-term impact of the IP? Very often, we do that by examples.

We know a good example of—it's actually a U of T example. A researcher discovered an algorithm that could do X. He walked across the street to MaRS, talked to an expert there, and he said, "Wow. If you can do that, could

you do this?" The "this" was: "Could you track what was happening on social media around a specific product?" A month later, the researcher came back and said, "Yes, I've redesigned the algorithm to do this." They started a company; it was a company called Sysomos. Two years later that company had, I think, 250 employees and was sold for a significant amount.

I think that as long as we keep seeing examples like that and we can track those examples where invention gets turned into a solution that gets sold on the market, that is creating jobs and wealth, those are the very strong indicators, because tracking every single piece of IP would be onerous and difficult. That's the first part. But, having said that, we need to work with the institutions to see if there's a better collective tracking system.

The other piece that you mentioned around not knowing what's happening around the rest of the government: Do we track what happens with all the research money in every other ministry? We have at times, on and off, done that. Yes. But I think the other important thing to note here is that almost every ministry funds some kind of research. Sometimes it's larger; sometimes it's smaller. The Ministry of Research, Innovation and Science is by far the largest investor in research. We are one of the two ministries that invest in research as an economic development tool, where we try to link our investments to the growth and innovative capacity of the economy.

Most of the other research that gets done—it's really important because it's helping those ministries make good, sound policy decisions. For example, MNR does lots of fish and wildlife research, not so much as an economic tool, but to do a good job of managing our fish, water and wildlife resources. There is not a lot of IP coming out of that, but it's really important. I could actually track that. I could just ask them: "How much do you do that?" By the way, we've actually developed and tested a tool to do that—

Mr. Percy Hatfield: Let me interrupt and just say, in here as well, surveys go out, surveys on how you're doing. What's the response? Unfortunately, the response from the survey is pitiful.

I guess my question is, as a funder, why would the government continue to give money to universities or anybody else if they're not giving you any information back in their surveys? Shouldn't there be a policy, "Comply with my survey or don't get any more money"?

The Acting Chair (Mrs. Julia Munro): Excuse me. If I could just ask your indulgence, the Auditor General would like to make a comment.

Ms. Bonnie Lysyk: I just wanted to comment for the record that at the time of the audit—because I think something was said and it might be interpreted the wrong way. At the time of the audit, the provincial funding for university research by ministry and agency was not compiled by the ministry. In fact, my staff had to go to a lot of effort to pull together the information to confirm, as best we could, what total spending across government could be. I just want to correct that for the record.

I'm not saying that the money in different parts of the government wasn't being spent for research—just that

the total number of what was being spent was spread out across ministries. We had anticipated, when we started the audit, that the Ministry of Innovation would actually be capturing all of that because that was part of the innovation agenda. I just wanted to correct that for the record, because I think the member asked a question and I think deserves a direct answer on that.

Mr. Percy Hatfield: Thank you.

Mr. Bill Mantel: Right. Those are the facts. Thank you for clarifying that. In our response, we said that, yes, we've developed a tool now that we can survey every ministry across the government annually to come up with that number, and that's an important thing to track. But one needs to understand that most of that research is done to help the government make good policy decisions and not in the same vein as us, where we're trying to create new knowledge, new inventions, new ideas and new intellectual property for economic growth.

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I think it also bears pointing out that every single one of those ministries that funds that research has relationships with the academic sector, to help become better at developing policy, better regulators, better in lots of ways.

So, yes, it's important to track the research. There's a lot of different facets to the relationship between the province and our research sector—our very sophisticated, world-class research sector.

You talked about the surveys. We get a 100% response rate from the universities on our research surveys. The survey that was noted in the auditor's report was a survey of companies that we do through the network of entrepreneurs. We have a sophisticated network of regional innovation centres where we're helping entrepreneurs start companies and hone their business strategy, introducing them to investors to help get their companies financed. We track a lot of measures on those companies. We certainly track the amount of investment that they get. We track their employment growth. We try to track their sales growth. We track export growth. There's a range of important commercial measures that we're doing, because those are the next steps of the innovation pipeline. It starts at the universities, but the next step is building companies around that. I think it's just—

Mr. Percy Hatfield: I'm sorry to interrupt. I know I'm running out of time. I've got 117 questions and not enough time to ask them. I lie—not 117.

Giles, you mentioned the round table. You've met and you're following up. What feedback are you anticipating, at the end of the day, from the participants of that round table?

Mr. Giles Gherson: It's probably slightly too early to tell. We had the first one, and it was interesting because we put it together and we didn't know what we were going to hear. I have to say, of all the things I've done in government, in terms of enthusiasm—there was huge enthusiasm around the table to really chew over the issue. So it tells you that there's something there—whether it's federal or provincial.

As I said, there were three areas that emerged in that first round table. One was education about IP, because a lot of people who go to university or go to college never think they're going to be inventing something, necessarily. At Waterloo, I think a lot of them do, but not necessarily. The idea would be, if you're in high school, you probably should know something about the idea of intellectual property and patents—because it's invisible; you don't see it. But when you pick up a pen or the smartphone that Vivek talked about, hundreds of—it's really a composite of patents. People don't see it that way, but all of those things can be reused in different ways. So it's a huge financial value that we haven't been focused on as a society. What we got around that table was the sense that, God, have we been missing the boat on this? Other places, particularly in the United States and Israel and a couple of other places, have really been thinking hard about IP. I think we've got a protection system in place—but the phrase that I hear and that I like is “strategic management of IP.” So we have protections of IP, but are we managing it strategically?

I'll hand it off to George to tell us more.

Dr. George Dixon: You were alluding to the concept of making sure people are aware of what IP is and what it can do for them. We spend a lot of time at the University of Waterloo attempting to educate people with respect to what IP is, how you protect it, how you commercialize it, what you do with it and what its value is. I'll give you an example. We have workshops for every new faculty member that joins the university on IP and what the implications are. Frankly, most of them are already aware of what it is, but we do it anyway. All graduate students—we run about six to eight workshops a year informing them. Waterloo is a largely co-operative education university. Last year, we did 20,000 co-op placements with the private sector. Every co-op student, before they go out on their first work term, effectively, has a workshop on IP—what it is—before they actually enter the workforce.

I'm not trying to brag about Waterloo; I'm trying to make the point that this educational component is critical to the management of IP and the utilization of IP within the university and, frankly, within the broader society. We spend a lot of time on the educational component that I think sometimes gets missed in the discussion.

Mr. Percy Hatfield: I know we have a lot of IP at the University of Windsor as well, and I'm very proud of that.

I don't know how much time I have left.

The Chair (Mr. Ernie Hardeman): You have about six minutes.

Mr. Percy Hatfield: Oh, I have a lot of time.

The science—what is it? The science officer, I think?

Interjection: Chief Science Officer.

Mr. Percy Hatfield: Did I miss it? Has that person—has there been a date selected for that?

Mr. Giles Gherson: No. What has happened is, it was announced in the throne speech, and we were directed to essentially formulate the position, if you will, and then go

about the process of hiring a Chief Science Officer. The federal government has been at this for a year and a half, I think. We're hoping to leverage some of their expertise and the work that they've done over the last while in trying to understand—because there are many different models of what a Chief Science Officer would do. I think at the most basic level it's bringing a degree of acuity about science in all its permutations to the government.

Many ministries have science functions, as Bill was saying earlier, and you could probably identify people—well, even someone who might be called the chief scientist, if you will, but there's no one with that title, whether it's the Ministry of Health, whether it's the Ministry of the Environment and Climate Change, whether it's the Ministry of Energy or what have you. What this person would do is be the connector for those people and be a bit of a central place for government science: Is it being conducted at the right level? Are we missing something? So it's really bringing a kind of oversight, if you will, in a collaborative way to the rest of government in terms of science.

If you look at different models, the UK is a really good example. The chief science officer there gets involved in emergency management—it's Mark Walport in the UK—and brings a committee together of scientists when there's a SARS outbreak or something like that, because of the network he can draw on to bring advice to the centre of government.

There's something that I think you can almost call the scientific method: evidence-based decision-making. I think the chief scientist would be expected to weigh in on policy decisions around government where—you know, the phrase is used, “evidence-based decision-making,” but is scientific rigour really there? I think that's something that would be helpful.

We live in a science age, so I think there's a view that much of policy these days is infused with science, but it has to be good science. The role of the Chief Science Officer is fundamentally about ensuring that the quality of science that is being brought to bear and the nature of the scientific method, if I could say that, is appropriate.

Mr. Percy Hatfield: Would that person, for example, keep track of the funding allocated by the government to research and innovation?

Mr. Giles Gherson: I would expect. We haven't actually said, “Here are all the functions that this person will do.” We're trying to think what the most important ones are, and in the basket of things that this person might be charged with doing, that would be one.

Mr. Percy Hatfield: Right now, the ministry doesn't release performance results for research funding or commercialization activities. Would this person, then, start releasing that kind of information?

Mr. Giles Gherson: I think that it's premature to say. Obviously, there are going to be all kinds of questions about what this role will do, what it should and shouldn't do. I think at the moment it's in the crafting stage. We're out talking to a lot of people about what they think it ought to be, and we're looking at other jurisdictions to see what best practices are.

Mr. Percy Hatfield: All right. Thank you.

The Chair (Mr. Ernie Hardeman): You're finished? Okay. Thank you very much. We now have between 16 and 17 minutes for the next round.

I just would remind the committee again and the delegations that the committee is not suggesting that what you're doing is not the proper thing. The discussion is about the auditor's report as it relates to doing the audit on this whole program. If I could remind the committee members to see if we can stay focused on that, we'd appreciate that. Thank you very much.

Mr. Milczyn.

Mr. Peter Z. Milczyn: I want to thank you for making the very important distinction that not all government-funded research is the same. The Ministry of Transportation doing research into different types of paint for lane markings isn't the same as funding the universities and the kind of research they're doing. So it's not all apples and apples; it's apples and oranges. Thank you for making that distinction.

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Getting to the crux of what's before us today, there were six recommendations that related to the work of the ministry and nine recommendations that related to how universities track intellectual property—the commercialization of it, the value of it. Could each of you tell us the progress you've made in responding to the Auditor General's respective recommendations, perhaps starting with the ministry and then moving to the universities?

Mr. Bill Mantel: A lot of these responses were contained in the original report that we sent back to the Provincial Auditor and in the report that we provided to this committee in August. We've made some progress since then.

Certainly, on the first recommendation—and I think there were a lot of conversations about this—around tracking government's overall investments, we have designed a research inventory tool for tracking that, and we're, hopefully at least, going to start testing that very soon. I think that's an important recommendation by the auditor, and we intend to fulfill that very soon. I think that's an important piece. As the federal government goes back to implementing the long-form census—we were actually a big part of that, where we coordinated this data collection across the province, and I think it's going to be important to restart that whole process.

On the multi-year work plan, based on the Ontario innovation agenda: I could restate everything that we're doing—I could link virtually every one of our actions that we've undertaken in the last six or seven years, which are not static, by the way. Every year, we're constantly reviewing and evolving everything we do around how we fund research, what research we're funding, how we get that research more efficiently moved out from universities into the private sector; how we build the innovation system out that helps entrepreneurs start companies build better business strategy, get those companies financed, get products on the market and start selling to customers in Ontario and customers around the world, basically building our export market.

Continuing to focus on skills—that includes skills in the research endeavour, but more and more, it's about the human entrepreneurial capacity to take important discoveries, turn them into solutions that the market needs, and push those solutions into a very competitive global market. We talk about barriers to innovation; I think it's less about regulatory barriers to innovation and more about: Can we shore up those capacities in our economy to be able to continue to turn important research ideas into products that solve problems or meet need and make money? So I think we're constantly upgrading that and constantly reviewing those and trying to get better at those all the time. That was the auditor's second recommendation for the ministry.

Benchmarking the progress of implementing the OIA: As the deputy pointed out in his opening remarks, there are a lot of independent third-party measuring sticks that are out there, and we look at every single one of them. For example, we know that four of the top 10 Canadian research universities are in Ontario. The Council of Canadian Academies ranked Canada sixth in the world for the impact of its research. That was in 2012. Half of all of the research that happens in the country is in Ontario. We couldn't get provincial-level data, but certainly, given Ontario's size and strength in the whole country, that is a pretty significant accomplishment, given the size of the province and the country: that we rank sixth in the world for the impact of the research. I think it shows that we're good at picking off the best science in the world and funding that.

Around addressing commercialization barriers—that whole area around entrepreneurship, entrepreneurs and being able to start and grow companies: Very recently, McKinsey ranked Canada—and, again, we don't have provincial-level data on the McKinsey report—number two in the world around entrepreneurship and our capacity to start and grow companies. If you look at Ontario, it's anywhere between 40% and 50% of that whole endeavour. Those are measures. We dreamed about that 10 years ago when we embarked on implementing the Ontario innovation agenda.

The other one, a study called the Global Entrepreneurship Monitor, again, ranked Canada first in the world on total entrepreneurship activity and had a lot of measures around Ontario's entrepreneurial capability. We have very high rates of participation by women.

Certainly, most entrepreneurs perceive very low barriers to entry, very low barriers to being able to start and grow a company, and I think those were exactly the kinds of indicators that we would want to see when we talk about the capacity for that.

The fifth recommendation was around measuring the socio-economic impacts of the research. The auditor's report also pointed out that that's a very difficult thing to do and very few jurisdictions around the world have really nailed that. I think that's an area where we constantly strive to do better; for example, in areas like health care, where it's entirely possible to take some research and look at the impacts on the health care

system. A good example is the Ontario Institute for Cancer Research. They had a look at prostate cancer, and what they realized was that prostate cancer is actually about 20 different kinds of cancer. They were able to formulate best-practice treatment recommendations for the cancer treatment system in the province, which massively reduced the number of surgeries for people—we were doing prostate surgery for people for whom it wasn't going to be useful—and allowed us to steer which medications to provide for which patient. We were actually able to document some pretty significant savings for the health care system, but also better patient outcomes. So I think, in the area of health care, that's where we're getting better at understanding, "This research had this impact in the health care system." It's almost case-by-case and hard to really measure that systematically and numerically, but I think it's important for us to keep trying.

Increasing the reliability of the results—we get 100% response to our surveys from universities on tracking those impacts of the research that we're funding. It gets harder when we're out there dealing, literally, with thousands of companies a year through our network of entrepreneurs, where the interventions are largely mentorship and advisory and helping that entrepreneur build out its company. We've pushed up response rates from something like 20% to 25%, to approaching 40%. You have to remember, when you're helping 1,000 or more companies start and spin off, it's very hard to track them all through the economy and where they're going.

Mr. Giles Gherson: Four thousand.

Mr. Bill Mantel: Four thousand a year—it's very hard to track that. We're actually quite ecstatic about the fact that we've got participation rates up over 30% to 35%. We keep trying to measure the impact of those interventions—and again, those are commercial measures: Is employment growing? Are sales growing? Are experts growing? Is investment growing? Those are the measures that we try to measure in the entrepreneurial part.

The Chair (Mr. Ernie Hardeman): Mr. Potts.

Mr. Arthur Potts: I want to just make a comment—and I apologize for missing the opening statements. We're going to get into recommendation 6; I think you're about to head into it—a very important issue about intellectual property and sharing in the proceeds of advances. I wanted to talk, maybe, to our friends from the University of Toronto, a university I graduated from. I did some work with a company called Monteco. We were very successful with a company called Biox. It was technology developed at the University of Toronto. They then participated in the funding and spun it off into a 60-million-litre, continuously operating biodiesel plant now out in Hamilton. I know that the university participated in the equity side of it. Would you have thought it was appropriate that the government, as well—for the funding we put towards the institution? As part of your answer to recommendation 6, could you maybe address those issues? And I'd be interested in hearing from the University of Toronto on it.

Mr. Bill Mantel: Let me take that last part of your question around equity investments. Our response to the auditor was consistent. In 2004 we had this very important conversation, in 2009 we had this very important conversation, and it's good to have it again. We have chosen not to take ownership in the IP that's generated from, largely, our flagship program, the Ontario Research Fund, the reasons being that the process of pushing IP out and getting it to be utilized in the economy is difficult enough. I think we would worry about the fact—how would companies react if they saw the Ontario government's name on every piece of IP that they were trying to license? So that's a concern, adding to the complexity is a concern, and we worry that it would actually slow down the process more than we think it should and actually run counter to the goal of getting these inventions into the economy, where they improve productivity, where there are new products, and we can create jobs.

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That's a difficult debate. Vivek mentioned the Bayh-Dole Act. They created the Bayh-Dole Act in 1982, largely because the government was taking ownership of all the IP and it was actually going nowhere. When they pushed it off to universities, it suddenly greased the wheels. I think every single university funder looks at that, like us—that it's a good thing to keep studying and asking the question every once in a while, but be careful not to do more damage than harm if you're going to take the ownership.

The same goes for equity. We have a very different strategy around that, which is our whole risk capital strategy, which wasn't talked about in the audit, but I'd be happy to talk about that, if you want.

I'll turn it over to Dr. Goel.

Dr. Vivek Goel: Sure. I think that's great example that you raised, because it would not just be the Ministry of Research and Innovation that would have invested in that program of research that would have taken place over many years. Probably a few dozen different funding agencies, provincially and federally and probably globally, were involved with that particular program of research.

If we were trying to track everyone's share—that you put in \$300,000 here, and we're going to take 0.05% of the equity and divide it up—it would just turn off any future investor looking at that relative to somewhere else they could go in the world to invest in a technology like that. There's that practical aspect to it.

I think the reality also would be that the fraction that would come back to any single funding agency or government would be so small—and even in the case of the university, while the equity valuation was huge, the university stake diluted down to a very small amount, so the relative return to the university is relatively small.

Go back to George's comments at the start: We do this because we want to get those technologies out into the marketplace. We want them to benefit Ontarians and Canadians. We want the jobs to be created here. So rather than focusing on how much of the licence revenue or

how much of the equity stake we have, we try to ensure that we get those companies growing as rapidly as possible.

Mr. Giles Gherson: Just in terms of the benefits that we get from successful companies that begin to scale up, there are tax benefits and employment benefits and so forth. It's not as if government, or the society at large, doesn't benefit from these very important innovations that are then commercialized.

Bill was going to talk a little bit about our risk capital program. We have the Ontario Capital Growth Corp., which has two funds: One is OVCF and the other is Northleaf Venture Catalyst Fund. They've been highly successful at investing in funds that invest in start-ups across the province, help scale them up and provide the necessary capital.

This structure has taken Ontario from being 12th, I think, in North America in terms of VC investment about seven years ago to sixth today. It has been a dramatic increase in terms of our ability to attract VC investment to our innovation ecosystem. I think, in a lot of people's view, we weren't doing very well at all, and, in the view of a lot of companies, to the point of: Are we losing IP out of the country because companies start up here—they own patents—and then they're bought out by a California company or a Massachusetts company or New York or what have you, and the IP goes out with them, in a lot of cases? What we've been trying to do—one of our core strategies—has been to do everything we can to retain these companies and enable them to grow here and, frankly, make it stickier for them to stay here and grow and prosper here.

The risk capital strategy that we've been using has been pretty successful in that regard. We're now just embarking on kind of a round 2 of our risk capital strategy.

Mr. Arthur Potts: If I could—

The Chair (Mr. Ernie Hardeman): Mr. Baker, I think, wanted to speak to that.

Mr. Arthur Potts: Sure.

Dr. Robert Baker: I just wanted to add to Vivek's comments on the impossibility of trying to track investment into IP. Not only do we have different agencies funding, say, a principal investigator; that principal investigator, in most labs, might have five or six grad students and a couple of post-docs. They will accrue different types of equipment over the years. They will have different sources. Some of those projects might end up with IP; some of them won't. It would be impossible, even in a principal investigator's own lab, to figure out what proportion of funding went to what projects. It is simply not doable.

Mr. Arthur Potts: It raises another issue that sort of falls under this heading, which is the loss of IP, period, in that institutions sometimes are doing great things and they don't patent it; they don't get intellectual property protected.

I'm thinking of another example in my riding in the Michael Garron Hospital, previously Toronto East

General Hospital. They put low-flow toilets all the way through and they have a higher water flow, less water. One of the nurses was noticing that people were getting sicker in her wing. They did a test and determined that the toilet was splashing toxic fluid out. So they went and worked together with a manufacturer and built a new toilet which is now used in hospitals all around the world. They had no intellectual property attached to it. Michael Garron Hospital would be self-funded, I suspect, from that one project alone, and they didn't do it.

Are we ensuring with the institutions that the IP is being retained, monetized so that even if it does flow out of the country, there are tangible benefits back to the community?

Dr. Vivek Goel: I think we have to talk about the kinds of training programs that we're starting to develop for graduate students, new faculty members. All of our universities, through support from the OCE program, have campus accelerators, where we have workshops on a regular basis on IP. We actually are very privileged that our intellectual property law firms come in pro bono and provide lots of coaching for our students and faculty. They see value in that because the better protected the IP is at the initial stages, if the patents are filed properly, it makes their task—

The Chair (Mr. Ernie Hardeman): Okay, I think we'll have to take that answer into the next question. We'll go to the official opposition: Mrs. Munro.

Mrs. Julia Munro: I've got too many pages here. Yes, I wanted to come back to the issue of the complexity of the kinds of projects that you do. One of the things that we learned in the auditor's report was the issue around ranking and the kinds of information that—this is page 550 of the report, where they compared how Ontario ranked in the global start-up ecosystem. In 2012, two Ontario cities were among the top 20. Toronto was eighth and Waterloo was 16th. Three years later, both Waterloo and Toronto dropped in ranking to 17th and 24th, respectively.

Since earlier indications of score cards, it tells us, were not always made public and this was, the report certainly calls into question—the opportunity for some concern over the changes in the rankings. I just wondered if you would care to comment on that.

Mr. Giles Gherson: I'd be very pleased to. Obviously, we were very interested in the Compass report when it came out. As you note and as the Auditor General noted, in the previous rankings, Toronto and Waterloo had ranked at eighth and 16th, and they fell to 16th and 24th. We've delved quite deeply into the research that was done. A couple of points probably need to be made.

It was interesting in the first instance that Toronto and Waterloo were not ranked as a single ecosystem. If you look at Cambridge-London in the UK, if you look at Boulder-Denver in Colorado, if you look at Silicon Valley between San Francisco and Palo Alto, Tel Aviv-Haifa—similar distances—they're all ranked as single ecosystems. We got ranked as two.

Waterloo is a pretty impressive place, as you know. And by the way, Ottawa is a huge innovator.

So we've got a three-pointed star, if you will, and it got ranked as two. If you put all those together, I think you'd see a different result, first off.

Secondly, the real question, the real issue, was not about start-ups; it was about scaling up. That's why, in our Business Growth Initiative, the innovation strategy we have that I was alluding to earlier, scaling up is a key leg of the strategy. In fact, in the reorganization of the ministry, we now have a division of commercialization and scale-ups. Probably, when you go around the world, you wouldn't find too many ministries or governments that had divisions called "scale-up," so that shows how seriously we take it.

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The issue was really the valuation of our companies. We've got this incredible ecosystem in terms of the density of start-ups in Toronto, in Waterloo—I should say in the GTHA; I mean, all over: Hamilton, Guelph, Mississauga. We've got incredible density up into Ottawa. But the companies aren't scaling as fast or being valued in the same way as, say, in Silicon Valley, or in Texas or in LA. When you look at that report, what you'll see is that we have way more start-ups than most of the jurisdictions that are cited as higher in the rankings than we are, but they're getting these so-called unicorns.

I'll give you an example. When I was with Minister Moridi in Tel Aviv a year and a half ago, visiting Teknion and other innovation sites in Israel to try to understand what they're doing that we're not, they said, "Well, how are you doing?" We said, "Well, we just had the Shopify IPO for \$100 million." They said, "Wow, that's impressive," except it wouldn't have made the top 10 in Israel in the last two years. There, in a pretty small country, they have two or three at the billion-dollar mark.

In San Francisco and the Silicon Valley area, there's so much money sloshing around that it actually pumps up the value of the scale-ups and enables them to have these so-called unicorns. You're seeing them in the UK, you're seeing them in Berlin, you're seeing them in Singapore and so on.

So why aren't we getting the valuations? Well, we probably don't have the pool of capital that many of these other places have. We're a pretty small place when you think of it. But we could do better, so we're focused very heavily now in policy terms on how we've got the second-largest financial services cluster in North America. Are we leveraging that? Are we getting our financial institutions' pension funds to invest in our technology companies the way they are in other countries?

In fact, sometimes our pension funds are investing more in, say, a Singapore start-up ecosystem than here. So we're asking a lot of questions and doing a lot of work to try to understand exactly why that's the case. We've had a number of round tables with financial institutions to try to get to the bottom of that and see whether there are some instruments that might be made available to encourage that.

Capital is key—access to markets. We still operate in Canada. We don't operate in the massive market of the

United States, the massive market of Asia or the massive market of the European Union—smaller though it may be soon. So there are some structural reasons why we're not doing as well as we should, but I can tell you that a fundamental focus of the government now is not so much start-ups; it's scaling up and trying to break through the barriers—MPP Hillier talked about some of the barriers, what are some of the barriers—that are inhibiting this growth.

A lot of it, by the way, is speed. We've got lots of companies that have come out of Waterloo or Toronto or Mac or elsewhere—Queen's or what have you—and they've got a great idea, but if they can't bring it to market really quickly and scale up really quickly, someone in Houston, Tel Aviv or Berlin who has got the same idea has leapfrogged you. Getting access to capital quickly, getting that mentorship—the kinds of things Bill was talking about in terms of the support structure around these companies to enable them to move really quickly—is really crucial.

We've learned a lot of lessons in the last four or five years, and we're trying to apply them.

Dr. Vivek Goel: If I could just add, I think the other challenge for us geographically is that these other regions that did move up in the rankings to displace us don't have the same challenge that we have. When our companies that are getting ready to scale up are facing the challenge around capital or acquiring talent, they can hop on a plane, go to Boston or to Silicon Valley and get capital and hire people there, whereas for the companies in Tel Aviv or Singapore, it's a lot harder for them to move. So it becomes doubly important for us to have the kinds of risk capital programs, talent attraction programs that are being worked on, because we have a much lower barrier to exit, so to speak.

Mrs. Julia Munro: That leads me to a sort of sidebar issue, and that is: Is there a balance to be achieved for the need for collaboration against the need for confidentiality?

Mr. Bill Mantel: The answer is yes, but I have to say that that is a very, very difficult question. I've been involved in all manner of conversations in trying to bring collaborations together. I'm not sure that I would want to say that there is a hard and fast rule there.

I think that the conversation we're having around upgrading our level of sophistication in our IP strategies, particularly with our companies—I think our universities are actually really good. But upgrading the level of sophistication and getting that education early on is really important. Making sure that these companies are not bargaining away their IP through some loophole or something is really critical.

Having said that, it is entirely possible to build some very strong, very sophisticated collaborations where there are very clear rules around how IP is treated. Our universities are doing it. We've done it with companies like IBM and lots of other large ones. The important thing to do there is to make sure you have a very open, clear, honest, authentic conversation about, in any big collabor-

ation, how we are going to treat the IP: who gets it; under what circumstances; who owns it; what are the percentage shares and all of that stuff. It's entirely possible to figure that out. I think you guys probably spend a lot of your days, actually, in those very conversations when they're embarking on a research collaboration with a big company or any kind of company.

I think the good news is that we're having way more of those conversations, and we're getting way better at resolving those issues faster and developing some models that we can repeat of how we share IP and how IP gets treated in those very large collaborations.

It's a really important question. I don't know if there will ever be a single answer to that. But having a number of tools and models to be able to treat it is important.

I don't know if Dr. Goel wants to weigh in.

Dr. Vivek Goel: I'll just give a historical example. Deputy Gherson referred to the discovery of insulin. The University of Toronto chose to provide non-exclusive licences to a number of pharmaceuticals back in the late 1920s, which got it out to market and saved millions and millions of lives. The university could have taken an exclusive licence and tried to commercialize it on its own through Connaught Labs and, maybe 20 years later, it would have gotten to market. Now we would probably have billions of dollars instead of the \$120 million that is in our Connaught Fund, but there would have been millions and millions of lives lost.

That's the balance that we're always looking at. As I said, it's about getting the results of our research out into society and helping people. Making money: That's wonderful when it happens, but if that's made the primary purpose for universities, I think that it would have drastic consequences for us.

Mrs. Julia Munro: I appreciate the candour of your responses. I realize that there isn't one pat little phrase that would take care of it, but I think it's really important to go away with the confidence that those issues are being addressed according to the circumstances you face.

The Chair (Mr. Ernie Hardeman): Mr. Hillier.

Mr. Randy Hillier: Just going back to the barriers—and this is more for just my own understanding. In my experience and in my conversations with individuals, small and medium-sized entrepreneurs and enterprises, and bringing new technologies to market—how do they fit in with your round table discussions? How do they fit into the Ministry of Research and Innovation—those people who are outside the academic field but who we know drive a significant number of new technologies and research?

Mr. Giles Gherson: I can get you the breakdown. I think that, at the first round table, we had 53 participants. I would say that about half at least were from the private sector. They came from technology companies or associations of technology companies, the Canadian Council of Innovators, with Jim Balsillie, for example, being a key one, and, actually, one of the big instigators that really helped us pull it together. We had some senior legal members from law firms—Norton Rose, for example,

which is one of the firms that I think Vivek referenced earlier as doing a fair bit of pro bono advice to entrepreneurs. There were a couple of other law firms there. The banks were there. So it was a really broad group, because it's such a complex community.

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One of the things that people are struggling with, I think, is not just can the province do any more, because I think there is an issue about that, but can we, as parts of this complex structure, do more? Can the law firms do more, and what should they be doing? Can the universities and colleges be doing more in terms of bringing on—and we heard George talk about how, at Waterloo, undergraduates are receiving instruction in understanding the complexity of IP. But how much more should be done, and at what price point?

Mr. Randy Hillier: For the individual small business that has some new technologies that they want to commercialize, is there a door at the ministry for that individual to go through and get advice and to share the barriers that that person or that firm is experiencing, and then have an advocate behind that door to assist with the barriers that they may be facing?

Mr. Giles Gherson: The main door to go through is one of our regional innovation centres. If you're an entrepreneur, in almost any community around Ontario, locally there will be a regional innovation centre. That's the place where they incubate these small technology firms. They offer a lot of advice and support, as does the OCE, the Ontario Centres of Excellence. If the OCE is marshalling you or helping you, one of the things they're going to be talking to you about is your IP, as well as how we find capital for you; are you looking at the right market; is your business plan the right business plan—those kinds of things. MaRS does the same; Communitech does the same; and Invest Ottawa, NORCAT in Sudbury and so on. Those places do that, as well as the campus-linked accelerators, which we have at every campus. So we've got lots of venues for entrepreneurs to get this kind of advice.

I think what we heard, though, was still that it's a kind of mindset: "I'm an entrepreneur; I'm an engineer. I've got a great idea. I really want to commercialize that idea. I have no money. I've scraped together some money, but I've only got three people working with me. You're telling me now that I have to spend some time on IP? I don't even know if I'm going to get this thing to market, so let me put that aside." But the advice is going to be: "Uh-uh. You've got a great idea, and you'd better be thinking about protecting it." Because even if this first idea fails, someone—or you—could use that intellectual property, that patent, in a different way, and now, bingo, you've got a world-class product on your hands. You don't want to give that away in the first instance. So we heard a lot about the need for people to be much more intentional about protecting and managing their IP.

Back to the province: Is there a role for us? It's an open question. I probably shouldn't be saying this, but it's an open question about whether we should be doing

more in an active way to think about patent pools, patent pooling, for our jurisdictions. It's a question that we're going to be asking at our round table. The answer may be "No; it's way too expensive and doesn't yield the right results." Others might say "No; jurisdictions like Singapore, like Korea, like Japan and France"—

The Chair (Mr. Ernie Hardeman): Moving right along—

Mr. Randy Hillier: We'll get more into the patent pool next time.

The Chair (Mr. Ernie Hardeman):—the third party: Mr. Hatfield.

Mr. Percy Hatfield: I'll use this round to talk to the academics, if I could. Professor Dixon, Waterloo is different because of the creator-owned approach as opposed to the institution-owned—and if this is not a fair question, just say so and I'll ask something else. What priorities would you like the ministry to set to improve university intellectual property standards across the province?

Dr. George Dixon: It probably is an unfair question, but I'll answer it anyway.

I get very nervous when people start to dictate the nature of who owns IP and how you protect IP, for the simple reason that protecting IP is the easy part. The part that is difficult and that actually matters is: What do you do with it after you've got it? How do you commercialize it? How do you move it forward?

I tend to be very concerned when people come up with what—and, by the way, the ministry has not done this. They have avoided this completely. Where I would get concerned is if someone were to prescribe a specific pathway, that this was the one and best way to protect and commercialize IP, because it is not a single component. Depending on what field you're in and the nature of the IP, there are a number of different vehicles to weigh so that you can maximize the commercial and socio-economic benefit of that. So it's not about one thing; it's about a whole family of approaches. I think my main concern is that we maintain a level of diversity in the approaches to how you protect and commercialize the IP.

I suspect my colleagues might have another comment.

Mr. Percy Hatfield: What advantage would you say the creator-owned approach at Waterloo affords?

Dr. George Dixon: Sorry, I didn't hear you.

Mr. Percy Hatfield: What advantage would you say the creator-owned approach at Waterloo has over the institutions—

Dr. George Dixon: Well, I think the main advantage is that there's a very real incentive for the owner of the IP to do something with it. The main advantage that we see as a university is that we attract people to the institution who are interested in an entrepreneurial initiative and who are interested in effectively setting up companies and moving their IP out, frankly, for economic gain for themselves. But the amount of economic gain that it generates there is dwarfed by the impact that it has on the broader economy and job creation within the region.

We undertake a review every five years, run by PwC, on the economic benefit of the university to the region and to the province. We did that in 2008 and 2013. It will come around again in 2018. There is effectively exponential growth in the region associated with that.

The other thing is, it's often not about the university and how the university deals with the IP. It's the ecosystem that that university is sitting in, Waterloo region and all of our other partners, and how we work together to optimize the nature of our IP policies. It's not a simplistic approach.

Mr. Percy Hatfield: Thank you.

Dr. Goel, I'm just curious: You've been at this gig for a couple of years now, next month. What priorities would you like the ministry to set as standards? If it's not fair, we'll move on.

Dr. Vivek Goel: I think what was interesting about the Auditor General's selection of the three institutions was that they selected one institution with the inventor-owned, one with the institution-owned, and ours, which has a hybrid where there's actually an inventor's choice, so to speak, of which way to go.

I think I would just echo the point that there's not a single right solution. If you have something—and we talked earlier about the areas of strength being in life sciences. If we're talking about drugs or new life science technologies, medical devices, they can have a very long pathway to commercialization. There's regulatory approval, there are clinical trials and so on. The cost of doing that before the company will ever make any money can be huge. In an inventor-owned model, instead of a few thousand dollars for patenting costs, and you might get some friends and family to help you get your company set up, you're looking at a few million dollars to do those first phase 0 types of trials, and then millions of dollars to start to do the phase 1, 2 and 3 studies to actually get something to market.

Faculty can't do that on their own. In fact, it takes them into a realm that they're not necessarily well prepared for. If we went with a strictly inventor-owned approach, we'd be asking people to come out of their labs, which they have trained in and done really well, and move into becoming a business CEO and regulatory expert.

So I think, in answer to your question, certainly I see, as we said earlier, the IP issues—I think we've actually got some good frameworks in Ontario. This language of "regulatory burden"—there are actually not a lot of regulatory burdens around IP. I think what's being referred to when entrepreneurs might talk about that are a few things in addition to what has been mentioned. It can take a long time, particularly in the health space, to figure out what you need to do. Some of the new programs that have been created—jointly between your ministry and the Ministry of Health, there's now an Office of the Chief Health Innovation Strategist. That role has a mandate to actually help get innovations into the broader health care system.

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At MaRS, we have a program called EXCITE, which works with our entrepreneurs, if they're working in the

health space, to help them identify up front, before they create their company and they get going, what the regulatory approvals are and what's going to be required to get the Ministry of Health to approve a particular product for funding in the health care system. So when they design their business plan, they work that into it. What I would certainly like to see is more programs like that which would help our entrepreneurs in figuring out how to get into the markets in this country.

Mr. Percy Hatfield: If I can skip over to Rob, I want to ask a facetious question first. As a behavioural ecologist in animal behaviour, have you ever thought of coming to question period and telling us what we're doing right or wrong?

Dr. Robert Baker: Yes.

Laughter.

Mr. Percy Hatfield: I'm just having fun. I know Ted McMeekin would want me to have asked you that.

I guess I'll start off with a similar question on priorities: Do you have priorities that you would like the ministry to set to improve university intellectual property standards across the province?

Dr. Robert Baker: No, I don't see any need for that. I would echo the comments of my colleagues.

Just to perhaps add a little bit of detail, McMaster does own the IP, but it's definitely shared with the inventors. It's not like we just take it all. So there is a large component of shared IP with the inventor. Very much like George is indicating, we do that because we want the inventors to come forward and do it.

We also have a situation where, if an inventor says, "I just want to run with it. I want to develop it entirely on my own," we allow them to do that. But if they want to come in and use our services through our industrial liaison office, then we can provide that. Again, it's flexibility.

I think Vivek's point is absolutely the best one: We want to get the stuff out. That's our primary goal: to get these things out there.

Finally, one other thing I would say is that although we do own the property, I have the right, or there's a group of us who have the right, to kind of waive that IP right if we so choose. In some situations, the rewards are very, very small. They are not going to be commercially viable—very small amounts—and we can turn those back into more research projects, which may in turn create something commercializable.

Mr. Percy Hatfield: Rob, you may have answered my second question already, but I'll ask it in case there's more. What efforts are being made at McMaster to encourage an entrepreneurial culture amongst faculty and students?

Dr. Robert Baker: Okay, that's an excellent question, and there are two answers.

I've been around universities a very, very long time, and I've been interviewing new faculty for 20-odd years. Twenty years ago, no faculty entering the university ever asked about IP—none of them. They didn't ask about industry contacts and IP. It just wasn't an issue.

I bet you that now three quarters of the people I interact with say, "I was reading your IP policy. Can I do this? Can I do that?" Young faculty are very much aware of it. So there is definitely a time course in the movement of IP from universities to the market.

There are a lot of people who were hired 20 or 30 years ago and it's just not on their radar. Some of them pick it up and get engaged, and some of them do incredibly well, but there's a fairly large bolus of people who are just not going to be interested.

That is not true for the students. The students are entirely different from what they were 20 or 30 years ago. Our students are craving input on intellectual property entrepreneurship. They've already bought the story. They know the story that they are not going to work for one company. They know the idea that they have to get out there and do it themselves. Even if we didn't want to put on programs, they would insist, and we do put on a lot of programs for them, both at the undergraduate levels and at the graduate levels, and they're very well accepted.

Mr. Percy Hatfield: Thank you.

George, again, what role do you think institutions such as Waterloo should play in the development of appropriate socio-economic performance measures to gauge the outcomes of applied research?

I didn't write that. I hope I read it okay.

Dr. George Dixon: I think probably some of the comment I made earlier with respect to the economic impact analysis that the university does every five years in the region moves to that area.

We have a number of other approaches through our communications group that deal to some degree with the social impacts of the research and innovation within the institution. I think if you start looking at how you measure socio-economic impacts of innovation—this is actually a research area within a lot of universities, to try to figure out how you develop the appropriate metrics that are associated with this. We're doing some of that activity. I think it's probably a very real role of the universities to look at developing appropriate metrics and then participating in what is available now, the type of PwC audits of the activity and the impacts in the area.

I think it's actually a part of our responsibility as a university now to be able to demonstrate what our socio-economic impact on society is.

Mr. Percy Hatfield: Dr. Goel, in your submission, you indicated that you would have a recommendation report discussing the preferred framework, procedures and systems for tracking socio-economic metrics from research. Has that report been released?

Dr. Vivek Goel: We're working on this project. We have a number of components that we're looking at. First of all, we're starting with improving our tracking systems. This has been referred to a few times already. One of the challenges on the commercialization space is tracking these companies and the licences—because we might license to one company and then they license it on to another. We don't have the staff that can keep track of

everything, so we're trying to automate some of those things.

We also have to think of the burden that this reporting places on these small enterprises. Some of these are companies with just a few staff. If they've been part of our programs, part of OCE programs, part of other programs—every one of those people comes back and asks them. So to your earlier point about a survey, low response rates, particularly from the companies—they might be getting surveyed by a dozen different organizations that have supported them at different points in time, all being asked to track their outcomes. So what we're looking at, together with OCE and other organizations, is: Can we come up with a single tracking system? We're actually, surprisingly, working with a Canadian start-up called Hockeystick. Hockeystick is the growth curve referred to for rapid-growth companies. It's a Canadian company—so they have a play on words there as well. They have a cloud-based system that lets companies enter their data once and then provides access to multiple funders and so on. That's an example of the sort of thing we're working on.

The other big project that we're working on in terms of socio-economic impact—and, really, thinking about this got driven by the Auditor General's work—is an alumni impact survey. As we said earlier, our biggest way of translating our knowledge is through the teachings that we provide to our students. They graduate, they become entrepreneurs, they become professionals, they work in society and then they make contributions. We don't have a great way of tracking all of that. Many institutions such as Stanford and MIT have done studies like this. We're going to do this survey in the coming year and start to build that into the framework that was referred to in our response.

Mr. Percy Hatfield: Do I have time to lob a softball at McMaster?

The Chair (Mr. Ernie Hardeman): Two minutes.

Mr. Percy Hatfield: How are the post-secondary institutions, such as McMaster, contributing to research and innovation in the province?

Dr. Robert Baker: Well, we contribute to it in different ways. A great deal of the research that occurs in Ontario universities, including McMaster, is through direct industrial contracts with industry. These are not normally referred to as research grants. Normally, an industry needs a problem solved, and they come to our experts with our various platforms and so on—platforms that they normally can't afford themselves—and we work with them to solve their problems. That boosts their bottom line, and they do better. That's certainly a part of it.

The other part of it is on a broader scale—of understanding the basic science behind things. We certainly do a great deal of that. Then we also move, depending on the project, the basic science into the actual translation, into knowledge transfer, through publications and presentations—but also, in some cases, some individuals, as we've talked about quite a bit, turn to commercialization and want to actually develop the IP.

I'll go back to Vivek's comment: The main thing we do in innovation is we turn out high-quality personnel. We turn out undergraduate students and graduate students who are trained and who are ready to do things. To my mind, that's our most important thing. And we don't train students separate from our research projects. We immerse our students in our research projects so they understand the cutting edge of what's going on. Again, to my mind, that's the most important thing we do.

Mr. Percy Hatfield: Giles, best-case scenario: What do you get out of this committee when we write our report?

Mr. Giles Gherson: Your report.

Mr. Percy Hatfield: That's it? All right.

The Chair (Mr. Ernie Hardeman): That does conclude the time. We thank you all, gentlemen, for being here today and helping us with our deliberations as we proceed to write our report.

With that, thank you very much. We will just recess for a short period of time, and then we'll have an in camera session to decide on report writing.

The committee continued in closed session at 1443.



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